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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/630,248	07/30/2003	Xueying Huang	CL1943USNA	9378
23906	7590	07/03/2006	EXAMINER	
E I DU PONT DE NEMOURS AND COMPANY LEGAL PATENT RECORDS CENTER BARLEY MILL PLAZA 25/1128 4417 LANCASTER PIKE WILMINGTON, DE 19805			LIN, JAMES	
			ART UNIT	PAPER NUMBER
			1762	

DATE MAILED: 07/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)	
	10/630,248	HUANG ET AL.	
	Examiner	Art Unit	
	Jimmy Lin	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) 1,3,4,18 and 20-32 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2,5-17 and 19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                                   | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. ____.  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>10/30/03,4/30/04</u> .  | 6) <input checked="" type="checkbox"/> Other: <u>IDS: 5/6/04</u> .          |

## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election without traverse of Group II, claims 2, 5-17, and 19 in the reply filed on 5/5/06 is acknowledged.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 2, 5-17, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Templeton et al. (*Langmuir* 1999, 15, pg. 66-76) in view of Foos et al. (*Chem. Mater.* 2002, 14, pg. 2401-2408).

Templeton discloses a method for preparing a water-soluble gold nanoparticle coated with a mixed monolayer (abstract) comprising:

Mixing tetrachloroauric acid (i.e., a metal salt), tiopronin (i.e., a capture coating component), and a mixed solvent comprising sodium borohydride (i.e., a reducing agent and a water miscible solvent), and water (i.e. an aqueous solvent) (pg. 67, column 2, 3<sup>rd</sup> full paragraph). The pH of the mixed solvent would have a pH less than 7.0 because the sodium borohydride becomes a proton donor in water and is therefore an acid.

The water-soluble gold nanoparticle can be isolated (abstract).

Templeton teaches the above method in order to achieve a nanoparticle with increased water solubility, but does not explicitly teach using a shielding component in the method of preparing a water-soluble gold nanoparticle. However, Foos teaches that an ethylene glycol oligomer (i.e., a shielding component) can be used in the preparation of a gold nanoparticle (abstract) to increase water solubility (pg. 2401 column 1 – pg. 2402 column 1).

“It is prima facie obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose.... [T]he idea of combining them flows logically from their having been individually taught in the prior art.” In re Kerkhoven, 626 F.2d 846, 850, 205 USPQ 1069, 1072 (CCPA 1980).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have used an ethylene glycol oligomer in the preparation of water-soluble gold nanoparticles of Templeton because Foos teaches that an ethylene glycol oligomer can increase the water solubility of a gold nanoparticle.

Templeton and Foos do not explicitly teach a final water concentration in the reaction mixture, particularly from about 9% to about 18% V/V. However, a particular parameter can be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, and thus the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). Templeton teaches that while the metal salt and capture coating component are soluble in methanol, the crude nanoparticle coated with a monolayer is insoluble in methanol but quite soluble in water (pg. 67, column 2, 3<sup>rd</sup> and 5<sup>th</sup> full paragraphs). The starting materials dissolve in the organic solvent, and as the product forms, the nanoparticles coated with a monolayer precipitate into the water. The nanoparticles coated with a monolayer can then be easily separated from the starting materials. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to find the optimum water concentration of the mixed solvent by routine experimentation. One would have been motivated to do so in order to optimize the results of the process.

Claim 5: Templeton teaches that the metal of the metallic nanoparticle is gold.

Claim 6: Templeton teaches that the metal salt is tetrachloroauric acid (i.e.,  $\text{HauCl}_4$ ).

Claims 7,8: Templeton teaches that the capture coating component is tiopronin. Because the current specification exemplifies tiopronin as a preferred capture coating component, tiopronin can inherently capture at least one of the capture moieties listed.

Claim 9: Templeton teaches that the metal binding functionality binds to gold.

Claim 10: The tiopronin of Templeton has an SH functionality group that binds to gold. The tetraethylene glycol thiol of Foos (abstract) also has an SH functionality group that binds to gold.

Claim 11: Templeton teaches that methanol is a suitable solvent in the preparation of the gold nanoparticles (pg. 67, column 2, 3<sup>rd</sup> full paragraph).

Claim 12: Templeton teaches that the aqueous solvent is water.

Claim 13: Templeton teaches that the reducing agent is sodium borohydride (i.e.,  $\text{NaBH}_4$ ).

Claims 14-17: Foos teaches that the shielding component is tetraethylene glycol thiol.


Claim 19: Templeton and Foos do not explicitly teach that the shielding component comprises at least 50% of the mixed monolayer. However, one skilled in the art would have expected to modify the monolayer to have equal amounts of the capture component of Templeton and the shielding component of Foos with a reasonable expectation of success. A 50/50 ratio would still allow the gold nanoparticle to receive the benefit of increased water solubility because both the capture component of Templeton and the shielding component of Foos are taught to increase the water solubility of the gold nanoparticle. Therefore, it would have been an obvious modification to have the shielding component comprising 50% of the monolayer.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jimmy Lin whose telephone number is 571-272-8902. The examiner can normally be reached on Monday thru Thursday 8 - 5:30 and Friday 8 - 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

6/27/06



**TIMOTHY MEEKS**  
SUPERVISORY PATENT EXAMINER